assignment-3

October 30, 2024

[102]:
```
import pandas as pd
import numpy as np
import matplotlib.pyplot as plt
import seaborn as sns
from statsmodels.graphics.tsaplots import plot_acf, plot_pacf
from statsmodels.tsa.arima.model import ARIMA
```

[103]:
```
# Load the dataset
data = pd.read_csv('datasets.csv')
```

[113]:
```
#Remove trailing spaces from column names
data.columns = data.columns.str.strip()
```

[114]:
```
# Convert 'Date' to datetime format and set as index
data['Date'] = pd.to_datetime(data['Date'], format='%d-%b-%Y')
data.set_index('Date', inplace=True)
```

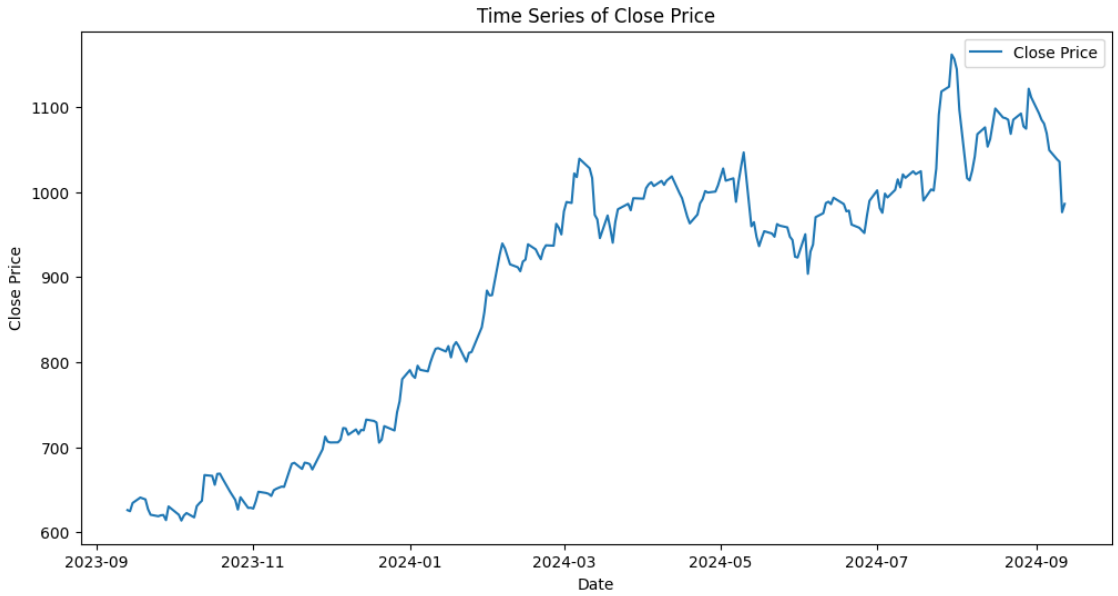
[115]:
```
# Remove commas and convert relevant columns to numeric
for col in ['OPEN', 'HIGH', 'LOW', 'PREV. CLOSE', 'ltp', 'close', 'vwap',␣
 ↪'VOLUME', 'VALUE', 'No of trades']:
    data[col] = pd.to_numeric(data[col].astype(str).str.replace(',', ''),␣
 ↪errors='coerce')
```

[116]:
```
# Check for missing values
print("Missing Values:\n", data.isnull().sum())
```

```
Missing Values:
 series          0
OPEN             0
HIGH             0
LOW              0
PREV. CLOSE      0
ltp              0
close            0
vwap             0
52W H            0
52W L            0
VOLUME           0
```

```
VALUE           0
No of trades    0
dtype: int64
```

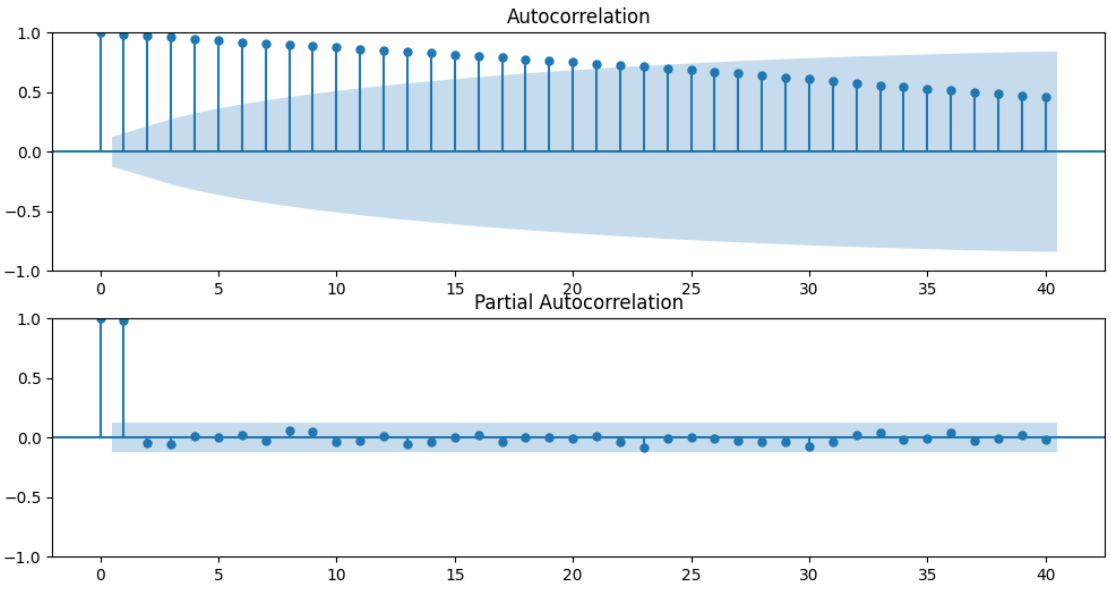
[117]:
```
# Step 2: Visualize the data to identify trends, seasonality, and outliers
plt.figure(figsize=(12, 6))
plt.plot(data['close'], label='Close Price')
plt.title('Time Series of Close Price')
plt.xlabel('Date')
plt.ylabel('Close Price')
plt.legend()
plt.show()
```



[118]:
```
# Step 3: Descriptive statistics
print("Summary Statistics:\n", data[['OPEN', 'HIGH', 'LOW', 'close']].
  ↪describe())
```

```
Summary Statistics:
                OPEN         HIGH          LOW        close
count    248.000000   248.000000   248.000000   248.000000
mean     885.813306   894.791331   874.155645   884.209274
std      157.811659   159.959591   154.479379   157.274130
min      618.700000   620.800000   608.300000   613.600000
25%      723.437500   727.250000   713.375000   720.162500
50%      950.000000   958.625000   937.725000   947.400000
75%     1005.000000  1014.587500   990.600000  1002.737500
max     1167.000000  1179.000000  1145.300000  1161.850000
```

[119]:
```
# Step 4: ACF and PACF plots for ARIMA model selection
plt.figure(figsize=(12,6))
plt.subplot(211)
plot_acf(data['close'].dropna(), ax=plt.gca(), lags=40)
plt.subplot(212)
plot_pacf(data['close'].dropna(), ax=plt.gca(), lags=40)
plt.show()
```



[120]:
```
# Based on ACF and PACF plots, select (p,d,q) for ARIMA. Here (1,1,1) is an␣
  ↪example.
model = ARIMA(data['close'].dropna(), order=(1,1,1))
model_fit = model.fit()
print(model_fit.summary())
```

```
C:\Users\Rohit\AppData\Local\Programs\Python\Python311\Lib\site-
packages\statsmodels\tsa\base\tsa_model.py:473: ValueWarning: A date index has
been provided, but it has no associated frequency information and so will be
ignored when e.g. forecasting.
  self._init_dates(dates, freq)
C:\Users\Rohit\AppData\Local\Programs\Python\Python311\Lib\site-
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```

```
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```

SARIMAX Results

Dep. Variable:	close	No. Observations:	248
Model:	ARIMA(1, 1, 1)	Log Likelihood	-1049.978
Date:	Wed, 30 Oct 2024	AIC	2105.957
Time:	19:39:12	BIC	2116.485
Sample:	0	HQIC	2110.195
	- 248		
Covariance Type:	opg		

	coef	std err	z	P>|z|	[0.025	0.975]
ar.L1	0.3049	0.650	0.469	0.639	-0.970	1.580
ma.L1	-0.2222	0.663	-0.335	0.737	-1.522	1.077
sigma2	288.2782	13.622	21.162	0.000	261.579	314.977

Ljung-Box (L1) (Q):	0.02	Jarque-Bera (JB):	359.68
Prob(Q):	0.88	Prob(JB):	0.00
Heteroskedasticity (H):	0.22	Skew:	0.92
Prob(H) (two-sided):	0.00	Kurtosis:	8.62

Warnings:
[1] Covariance matrix calculated using the outer product of gradients (complex-step).

[121]:
```
# Step 6: Plot model diagnostics
model_fit.plot_diagnostics(figsize=(10,8))
plt.show()
```